



RDM 01-002

In re application of)
)
LAWRENCE E. CONWAY et al.)
)
Filed: March 9, 2001)
)
Serial No.: 09/803,418)
)
Entitled:)
)
INTEGRAL PWR WITH DIVERSE)
EMERGENCY COOLING & METHOD)
OF OPERATING SAME)

Attorney Docket No. RDM 01-002

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Response
4/17/03
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Date: April 2, 2003

Commissioner of Patents
Washington, D.C. 20231

RESPONSE TO OFFICE ACTION

This is a response to the office action for the above application mailed on February 21, 2003. The Office Action Summary indicates under "Disposition of Claims" at 4) that Claims 1 to 36 are pending and in 4a) that Claims 1 to 21 are withdrawn from consideration, but then in 6) states that Claims 1 to 21 are rejected. The Detailed Action, however, clarifies the status of the claims by stating that Claims 1 to 20 are withdrawn as being drawn to non-elected groups and addresses the merits of the remaining claims, 21-36. Applicants concur that Claims 21-36 are pending as stated in the Detailed Action.

Rejection of Claims 21-29 Under 35 USC § 112

Claims 21-29 were rejected under 35 USC § 112, first paragraph, as containing subject matter not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, it was stated that "[t]here is not adequate description or enabling disclosure of how or in what manner the limitation of **extending outside of containment** is to be interpreted... Is this intended to be an additional barrier or containing

structure to the **containment structure** identified in the claim pre-ample, or does it imply an alternate form of containing the pressurized water reactor?"

Please note that Claim 21 was amended by preliminary amendment, dated May 30, 2001, to add "structure" after "containment" to make it clear that the containment structure referenced was the same as that referred to in the preamble. Accordingly, the rejection under 35 USC § 112, first paragraph, is moot. ←

Claims 21 to 29 were also rejected under 35 USC § 112, second paragraph, as being indefinite for the same reason. Thus, this rejection is also moot in view of the preliminary amendment to Claim 21. ←

Claims 22-29 all depend from Claim 21 and were rejected as dependent on the rejected claim. Thus, the section 112, first and second paragraph, rejections of these claims are also moot. —

Rejection of Claims 24 to 25 Under 35 USC § 112

Claims 24 and 25 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim subject matter which applicant regards as the invention. Specifically, it was stated that there is insufficient antecedent basis for the limitation "using gas" in line 4. Claim 24 depends from Claims 21 through 23. The limitation "using gas" appears for the first time in this claim sequence at line 4 in Claim 24. There is no basis for a lack of antecedent rejection of Claim 24. As discussed in MPEP 706.03(d) the lack of an antecedent basis is created when a claim calls for, for example, "said lever" or "the lever" and there is no previous recitation of "lever" to support the reference back. That is not the case here, as "using gas" is used in line 4 for the first time and does not imply a reference back to a previous reference to "gas". Furthermore, the cited section of the MPEP also states that this rejection "should ONLY be used in aggravated situations where the lack of antecedent basis makes the scope of the claim indeterminate". ✓
Such is not the case here.

The rejection further states that the claims are vague, indefinite and incomplete as to what is meant by "using gas" and questions whether the gas is an inert gas system, a post-accident combination of oxygen and hydrogen, or a gas/steam mixture. It is irrelevant what the source of the gas is in the context of Claim 24. The claim is clear in stating "using gas in the at least one suppression tank above the water". Furthermore, this gas in the suppression tank above the water is clearly differentiated from the additional —

"gas/steam mixture from the containment structure which compresses the "gas" in the at least one suppression tank above the water". Hence, Claim 24, and therefore, 25, meet the requirements of 35 USC § 112, second paragraph.

Claims 32 to 36 were rejected under 35 USC § 112, first paragraph, as containing subject matter not adequately described in the specification. Specifically, the source and type of "gas" implied by the limitation of "containment filled with gas" was questioned.

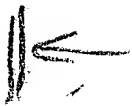
The type of gas and its source is not material to the process claimed. Typically, the gas within containment is air or in some cases, nitrogen. The function is what is important, not the specific gas used. Accordingly, the description is adequate to allow those skilled in the art to practice the invention claimed.

Claims 32-36 were also rejected under 35 USC § 112, second paragraph, as being indefinite for essentially the same reason. As mentioned, the source or nature of the gas in containment is not relevant to the claimed invention and hence, section 112 is satisfied.


Rejections Under 35 USC § 102(b)



Claims 30-36 were rejected under 35 USC § 102(b) as being anticipated by Gardner et al. (US 5,102,616).

Claim 30 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor that includes at least one steam generator mounted together with a reactor core in a pool of reactor coolant in a reactor pressure vessel. In response to a loss of coolant accident the gas in the containment structure together with steam in the containment structure resulting from accident is introduced into water in a suppression tank, also within the containment structure, to condense the steam. The water from the suppression tank is then selectively transferred to the reactor pressure vessel to keep the reactor core covered with water. This process utilizes the pressure generated by the steam formed as water within the reactor vessel boils off into the containment structure as a result of the accident. As the steam, together with the gas which forms the atmosphere within the containment structure is introduced into the water in the suppression tank, the steam is condensed thereby reducing pressure inside the containment structure. This condensed steam, as well as the other water stored in the suppression tank can then selectively be transferred to the reactor pressure vessel.

Gardner et al. discloses an integral PWR that includes a tank 134 containing water within a containment structure together with the reactor pressure vessel, as shown in Figure 11 cited by the Examiner. Steam from the pressure vessel 12 can be quenched in the water in the tank 34 by opening a valve 144 in the line 142. Thus, Gardner et al. does not introduce steam from within the containment structure into the water in the tank 134, but instead quenches steam taken directly from the pressure vessel 12. Thus, Gardner et al. describes a different system, which operates in a different way to achieve a different result than the method set forth in Claim 30. Accordingly, Claim 30 is not anticipated by Gardner et al. 

Claim 31 depends from Claim 32 and is therefore patentable over the reference for the same reason.

Claim 32 is an independent claim directed, in pertinent part, to a method of operating a PWR that, in response to a loss of coolant accident, introduces gas in the containment structure together with steam in the containment structure resulting from the accident into water in at least one suppression tank to condense the steam, and selectively transfers water from the suppression tank to a flood-up cavity within the containment structure in which the lower portion of the reactor pressure vessel containing the reactor core is disposed. Again, in Claim 32, it is the steam from within the containment structure which is condensed in the suppression tank, not steam taken directly from the pressure vessel as taught by Gardner et al. Furthermore, Gardner et al. teaches transferring water from the tank 134 either directly or through the tank 58 into the pressure vessel 12. It does not teach or suggest transferring water from the tank 134 into a flood-up cavity in which the reactor vessel is immersed. Although Gardner et al. discloses a chamber 130 around the lower end of the pressure vessel 12, this chamber is normally dry, but contains primary water coolant that might leak from the pressurized water reactor vessel so as to keep the pressure vessel 12 submerged in primary water coolant. See Gardner et al, column 26, lines 50-56. In fact, water that spills into the chamber 130 is pumped by the pump 170 up into the tank 134, where it can be pumped directly into the pressure vessel as described previously. 

 It is clear therefore that Gardner et al. discloses a method of operating a PWR that uses a different arrangement, which operates in a different way to achieve a different result. Therefore, Claim 32 is not anticipated by Gardner et al. 

Claims 33-36 all depend from Claim 32 and are therefore patentable over Gardner et al. for the same reasons.

Rejections Under 35 USC § 103

Claims 21-26 and 29 were rejected under 35 USC § 103(a) as being unpatentable over Gardner et al. in view of Schultz (US 5,255,296). Claim 21 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor comprising at least one steam generator mounted together with the reactor core in a pool of reactor coolant in a reactor pressure vessel wherein the steam generator has a secondary loop extending outside of the containment structure. The method comprises, in response to a loss of coolant accident, circulating cooling fluid through the secondary circuit of the steam generator to withdraw heat from the reactor pressure vessel and extracting the heat from the cooling water outside of the containment structure at a rate which, within no more than about three hours, lowers pressure in the reactor pressure vessel to a pressure at or below pressure in the containment structure resulting from the loss of coolant accident, thereby stopping or reversing the mass flow of reactor coolant from the reactor pressure vessel so that the reactor core remains covered without the addition of water from other sources.

In a loss of coolant accident, primary coolant in the pressure vessel can flood through the break if it is low enough, but also boils off into the containment structure. In the method of Claim 21, the steam generator which is inside of the pressure vessel in an integral PWR, is used to extract heat from within the pressure vessel through the secondary loop of the steam generator. As shown in Figure 1 of the specification, the fluid in the secondary loop is circulated through heat exchangers 29 immersed in a pool of water 37 stored in a shield building 25 which is outside of the containment structure 17. The capacity of this system is sized so that the pressure within the reactor pressure vessel is reduced to a pressure at or below the pressure in the containment structure resulting from the accident, thereby stopping or reversing the mass flow of reactor coolant from the reactor pressure vessel. Claim 21 calls for this to occur within about three hours.

While Gardner et al. shows a steam generator within the pressure vessel, it in no way teaches or suggests using the secondary side of the steam generator during a loss of coolant accident to reverse the mass flow out of the vessel. Instead, Gardner et al. relies upon the injection of water into the pressure vessel as described above, in order to keep the core covered and therefore from overheating. It was asserted in the Office Action that Gardner et al. disclosed the claimed invention except for the specific time period of about three hours, but that this time period would have been obvious since where "the general conditions of the

claim are disclosed in the prior art, see for example, the secondary reference Shulz [sic] (Column II, lines 18 to 35, stating **several** hours), discovering the optimum or workable ranges involves routine skill in the art. *In re Aller*, 105 USPTO [sic USPQ] 233.

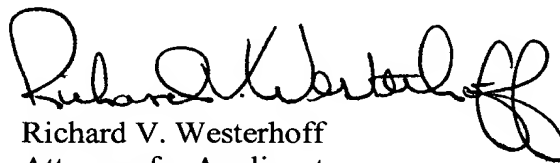
First, Schultz, which is directed to a gutter system for collecting condensate inside a containment structure merely mentions that "[i]n the event of a nuclear accident, the water in even a large heat sink tank may heat to boiling in several hours". This reference in the "background of the invention" section of Schultz referring to the boiling of water in a heat sink tank which is distinct from the reactor pressure vessel is totally irrelevant to the issue at hand. ←

Secondly, it is important to note that the citation from *in re Aller* relied upon by the Examiner requires that the general conditions of a claim must be disclosed in the prior art before it can be held that discovering the optimum or workable ranges only involves routine skill in the art. In the case of Claim 21, as discussed above, Gardner et al. does not disclose the claimed invention except for citing a specific time period for heat removal. Hence, the predicate for asserting that discovering the optimum or workable ranges involves only routine skill in the art is not present. Furthermore, secondary reference Schultz is directed to a different process, the time period for water in a heat sink to boil off rather than the time required to lower the pressure within a reactor pressure vessel during a LOCA to reverse the mass flow out of the vessel.

Accordingly, Gardner et al. and Schultz, whether taken singly or in combination, do not teach or suggest the subject matter of Claim 21.

Claims 22 through 29 depend from Claim 21 and are therefore patentable over the references for the same reasons. In view of all the above, reconsideration and allowance of the application as now presented is respectfully solicited.

Respectfully submitted,


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